

**What is claimed is;**

1. An optical module comprising:
  - a supporting substrate having a groove at which a member is disposed;
  - an optical element mounted at said supporting substrate;
  - a lens element positioned relative to said optical element, which includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said groove at said supporting substrate when said lens element is mounted;
  - one or more package components used to package said supporting substrate mounted with said optical element and said lens element; and
  - an interface that includes an optical fiber to be optically coupled with said optical element via said lens element and is positioned as said interface comes in contact with said package component.
2. An optical module according to claim 1, wherein:
  - said lens portion is constituted of a diffractive optical element.
3. An optical module according to claim 1, wherein:
  - said optical substrate is a silicon crystal substrate.
4. An optical module according to claim 1, wherein:
  - said optical element is either a light emitting element or a light receiving element.
5. An optical module according to claim 1, wherein:
  - said supporting substrate is held in an airtight space formed by said package components.

6. An optical module according to claim 1, wherein:  
said package components are coaxial package components.
7. An optical module comprising;  
a supporting substrate having a groove at which a member is disposed;  
an optical element mounted at said supporting substrate;  
a lens element positioned relative to said optical element, which includes a lens portion formed at a surface of an optical substrate to cause a light flux to exit in a direction different from the direction of an incident light flux and a projection portion that comes in contact with said groove at said supporting substrate when said lens element is mounted;  
one or more package components used to package said supporting substrate mounted with said optical element and said lens element; and  
an interface that includes an optical fiber, which is optically coupled with said optical element via said lens element and has a diagonal end surface, and is positioned as said interface comes in contact with said package component.
8. An optical module according to claim 7, wherein:  
said lens portion is constituted of a diffractive optical element.
9. An optical module according to claim 7, wherein:  
said optical substrate is a silicon crystal substrate.
10. An optical module according to claim 7, wherein:  
said optical element is either a light emitting element or a light receiving element.

11. An optical module according to claim 7, wherein:  
said supporting substrate is held in an airtight space formed by  
said package components.
12. An optical module according to claim 7, wherein:  
said package components are coaxial package components.
13. A subassembly comprising:  
a supporting substrate having a groove at which a member is  
disposed;  
a lens element that is mounted at said supporting substrate and  
includes a lens portion formed at a surface of an optical substrate and a  
projection portion which comes in contact with said groove at said  
supporting substrate when said lens element is mounted; and  
an isolator element that is mounted at said supporting substrate  
and has an isolator function.
14. A subassembly according to claim 13, wherein;  
said lens portion is constituted of a diffractive optical element.
15. A subassembly according to claim 13, wherein:  
said optical substrate is a silicon crystal substrate.
16. A subassembly according to claim 13, wherein:  
the section of said groove at said supporting substrate is any of;  
substantially V-shaped, substantially trapezoidal, substantially  
semicircular and substantially rectangular.
17. A subassembly according to claim 13, wherein:  
said projection portion has a circular arc shape.

18. An optical module comprising:
- a supporting substrate having a groove at which a member is disposed;
  - a lens element that is mounted at said supporting substrate and includes a lens portion formed at a surface of an optical substrate and a projection portion which comes in contact with said groove at said supporting substrate when said lens element is mounted;
  - an isolator element that is mounted at said supporting substrate and has an isolator function; and
  - a package component having a pedestal portion, wherein:  
said supporting substrate having said lens element and said isolator element mounted thereat is set at said pedestal portion.
19. An optical module according to claim 18, further comprising;
- a means for magnetic field application that is disposed at said pedestal portion and applies a magnetic field to said isolator element.
20. An optical module according to claim 18, wherein:
- said package component is a coaxial package component.
21. An optical module comprising:
- a supporting substrate having a groove at which a member is disposed;
  - an optical element mounted at said supporting substrate;
  - a lens element positioned relative to said optical element, which includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said groove at said supporting substrate when said lens element is mounted;
  - an isolator element that is mounted at said supporting substrate and has an isolator function;

one or more package components used to package said supporting substrate mounted with said optical element, said lens element and said isolator element; and

an interface that includes an optical fiber to be optically coupled with said optical element via said lens element and is positioned as said interface comes in contact with said package component.

22. An optical module according to claim 21, further comprising;  
a means for magnetic field application that applies a magnetic field to said isolator element.

23. An optical module according to claim 21, wherein:  
said optical element is either a light emitting element or a light receiving element.

24. An optical module according to claim 21, wherein:  
said supporting substrate is held in an airtight space formed by said package components.

25. An optical module according to claim 21, wherein:  
said package components are coaxial package components.

26. A subassembly comprising:  
a supporting substrate having a groove at which a member is disposed;

a light emitting element that is mounted at said supporting substrate and emits light with a first wavelength;

a lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said groove at said supporting substrate when said lens element is

mounted, is positioned relative to said light emitting element and converts divergent light emitted from said light emitting element to substantially parallel light;

a wavelength dividing filter that is mounted at said supporting substrate and has a function of dividing light into different wavelengths; and

a light receiving element at which light with a second wavelength having been divided through said wavelength dividing filter enters.

27. A subassembly according to claim 26, wherein:

said lens portion is constituted of a diffractive optical element.

28. A subassembly according to claim 26, wherein:

said optical substrate is a silicon crystal substrate.

29. An optical module comprising:

a supporting substrate having a groove at which a member is disposed;

a light emitting element that is mounted at said supporting substrate and emits light with a first wavelength;

a first lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said groove when said first lens element is mounted, is positioned relative to said light emitting element and converts divergent light emitted from the light emitting element to substantially parallel light;

a wavelength dividing filter that is disposed at said supporting substrate and has a function of dividing light into different wavelengths;

a light receiving element at which light with a second wavelength having been divided through said wavelength dividing filter enters;

one or more package components used to package said supporting substrate having the light emitting element, said first lens element, and said wavelength dividing filter mounted thereat and the light receiving element;

a second lens element that converts the substantially parallel light to convergent light; and

an interface that includes an optical fiber at which the light with said first wavelength having been converted to convergent light enters and the light with said second wavelength exits toward said second lens element and is positioned as said interface comes in contact with said package component.

30. An optical module according to claim 29, wherein:

said package components and said second lens element form an airtight space and said supporting substrate and the light receiving element are held in said airtight space.

31. An optical module according to claim 29, wherein:

said package components are coaxial package components.

32. A subassembly comprising:

a supporting substrate having a first groove and a second groove both adopting a first structure and a groove adopting a second structure which is positioned between said first groove and said second groove adopting said first structure;

a light emitting element that is mounted at said supporting substrate and emits light with a first wavelength;

a first lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said first groove adopting said first structure when said

first lens element is mounted, is positioned relative to said light emitting element and converts divergent light emitted from said light emitting element to substantially parallel light;

a second lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said second groove adopting said first structure when said second lens element is mounted, and converts the substantially parallel light to convergent light;

a wavelength dividing filter that is disposed at said groove adopting said second structure and has a function of dividing light into different wavelengths; and

a light receiving element at which light with a second wavelength having been divided through said wavelength dividing filter enters.

33. A subassembly according to claim 32, wherein:

said lens portion is constituted of a diffractive optical element.

34. A subassembly according to claim 32, wherein:

said optical substrate is a silicon crystal substrate.

35. An optical module comprising:

a supporting substrate having a first groove and a second groove both adopting a first structure and a groove adopting a second structure which is positioned between said first groove and said second groove adopting said first structure;

a light emitting element that is mounted at said supporting substrate and emits light with a first wavelength;

a first lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said first groove adopting said first structure when said



first lens element is mounted, is positioned relative to said light emitting element and converts divergent light emitted from said light emitting element to substantially parallel light;

a second lens element that includes a lens portion formed at a surface of an optical substrate and a projection portion that comes in contact with said second groove adopting said first structure when said second lens element is mounted, and converts the substantially parallel light to convergent light;

a wavelength dividing filter that is disposed at said groove adopting said second structure and has a function of dividing light into different wavelengths;

a light receiving element at which light with a second wavelength having been divided through said wavelength dividing filter enters;

one or more package components used to package said supporting substrate having the light emitting element, said first lens element, said second lens element and said wavelength dividing filter mounted thereat and the light receiving element; and

an interface that includes an optical fiber at which light with the first wavelength having been converted to convergent light enters and light with the second wavelength is exits toward said second lens element, and is positioned as said interface comes in contact with said package component.

36. An optical module according to claim 35, wherein:

said supporting substrate and the light receiving element are held in an airtight space formed by said package components.

37. An optical module according to claim 35, wherein:

said package components are coaxial package components.